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Child Temperament Moderates the Impact of Parental Separation on Adolescent Mental Health: The TRAILS Study

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The potential effect of parental separation during early adolescence on adolescent externalizing and internalizing problems was investigated in a longitudinal sample of adolescents ($n = 1274$; mean age = 16.27; 52.3% girls). Pre-separation mental health problems were controlled for. Building on a large number of studies that overall showed a small effect of parental separation, it was argued that separation may only or especially have an effect under certain conditions. It was examined whether child temperament (effortful control and fearfulness) moderates the impact of parental separation on specific mental health domains. Hypotheses were derived from a goal-framing theory, with a focus on goals related to satisfying the need for autonomy and the need to belong. Controlling for the overlap between the outcome domains, we found that parental separation led to an increase in externalizing problems but not internalizing problems when interactions with child temperament were ignored. Moreover, child temperament moderated the impact of parental separation, in that it was only related to increased externalizing problems for children low on effortful control, whereas it was only related to increased internalizing problems for children high on fearfulness. The results indicate that person-environment interactions are important for understanding the development of mental health problems and that these interactions can be domain-specific.

Keywords: temperament, parental separation, mental health, adolescence, person-environment interactions

Parental separation has become a common experience for children living in Western societies over the past 50 years (Amato & Keith, 1991b; Amato, 2001). The high rate of parental separation has fuelled numerous studies and ongoing debates about its consequences. The landmark review by Amato and Keith (1991a) and its update (2001) concluded that the association between parental separation and offspring's well-being is small, with a

median effect size of 0.14 on a variety of measures of adjustment including mental health. Longitudinal studies generally show that the association between separation and well-being is even further reduced when pre-separation emotional and behavioral problems are controlled for (Cherlin et al., 1991; Hetherington, 1989; O'Connor, Dunn, Jenkins, Pickering, & Rasbash, 2001; Strohschein, McDonough, Monette, & Shao, 2005). Two broad domains

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This research is part of the TRacking Adolescents' Individual Lives Survey (TRAILS). Participating centers of TRAILS include various departments of the University Medical Center and University of Groningen, the Erasmus University Medical Center Rotterdam, the University of Utrecht, the Radboud Medical Center Nijmegen, and the Trimbos Institute, all in the Netherlands. Principal investigators are Prof. Dr. Johan Ormel (University Medical Center Groningen) and Prof. Dr. Frank C. Verhulst (Erasmus University Medical Center). TRAILS has been financially supported by various grants from the Netherlands Organization for Scientific Research NWO (Medical Research Council program grant GB-MW 940-38-011; ZonMW Brain-

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of maladjustment and mental health are typically distinguished in these studies: internalizing (e.g., anxiety, depression) and externalizing (e.g., rule-breaking, delinquency) problems (Achenbach, 1978; Krueger, 1999). Combined, they are a good index of overall mental health. All in all, the current body of evidence suggests that the experience of parental separation is, on average, associated with a small but significant long-term increase in maladjustment, with the effects on externalizing behaviors being generally larger than the effects on internalizing problems (Amato, 2001; Amato & Keith, 1991b).

Substantial individual differences in post-separation adjustment have been found. Only 10-25% of the children that experience a parental separation grow up to have more emotional and psychological problems (see Lansford, 2009). This might be due to the multifaceted character of parental separation. It usually goes hand in hand with the falling apart of the family and a loss of social support from extended family members and friends, a drop in financial resources, and diminished parenting (Cherlin et al., 1991). In addition, children whose parents separate are generally exposed to conflict and distress long before and during the separation (Amato, Loomis, & Booth, 1995). Hence, most studies attempting to explain individual differences in post-separation adjustment have focused on family functioning and parent-child relations, such as long-standing family discord, parental conflict and absence, and economic disadvantage (Amato & Keith, 1991a; Hetherington et al., 1992). But how a child appraises and copes with parental separation and the associated turmoil and life-situation changes is also important. Child temperament can act as a marker for vulnerability and resilience to stressful events in general and can thus provide the conditions under which the effects of parental separation on mental health and adjustment are more or less adverse.

An interesting approach for elaborating on vulnerability and resilience in this respect is provided by goal-framing theory (Lindenberg, 2001; 2006; see also Sentse, Veenstra, Lindenberg, Verhulst, & Ormel, 2009). In the goal-framing approach, focal goals are hypothesized to influence what people attend to, what knowledge is being activated, how people evaluate things, and how they process information. The more important the goals, the stronger these cognitive and motivational effects are likely to be. Thus, when the goal pursuit is hindered, it is likely to lead to strong negativity effects and pathology in both behavior and emotion regulation (Baumeister & Leary, 1995; Deci & Ryan 2000). According to Deci and Ryan (2000) there are two universal fundamental needs with regard to the generation of well-being: autonomy and relatedness (also referred to as the need to belong). Research provides good support for the universality and the basicness of these two needs (e.g., Baumeister & Leary, 1995; Chirkov, Ryan, Kim, & Kaplan, 2003; Nieboer, Lindenberg, Boomsma, & Van Bruggen, 2005). Especially in adolescence these basic needs are generally unsettled and important but difficult to reach (Allen et al., 2006; Patrick, Knee, Canevello, & Lonsbary, 2007). Adolescents' autonomy is often contested between adolescents and parents (see Agnew 2003; Sentse, Dijkstra, Lindenberg, Ormel, & Veenstra, 2010), and their sense of

belonging is equally precarious (Jarvinen & Nicholls, 1996; Sentse, Lindenberg, Omvlee, Ormel, & Veenstra, 2010). For this reason, it is likely that satisfaction of these needs is a chronically focal goal in adolescence. That makes problems in the realization of these two goals prime suspects for the development of pathology.

Both personal and environmental factors may hinder or facilitate goal achievement to various degrees depending on their interplay. That is, the impact of an environmental stressor such as parental separation may be extra adverse for children with a temperament that hinders goal-achievement. In general, children with temperaments characterized by disinhibition, negative emotionality, or fearfulness are assumed to be more often the elicitors as well as the targets of aversive responses by important others such as peers and parents (Rutter, 1987). This also affects the realization of autonomy and belongingness in particular. For the present study we have focused on two temperament aspects, i.e., effortful control and fearfulness, as they may have direct links to both goal pursuit and psychopathology (Caspi, Henry, McGee, Moffitt, & Silva, 1995; Frick & Morris, 2004).

Effortful control is the capacity to voluntarily regulate attention and behavior (Rothbart, Ellis, Rueda, & Posner, 2003). Children who have difficulties in regulating emotion and attention have difficulties to regulate the goal-frames they are in, i.e., to oversee the short-term and long-term consequences of behavior and attention for goal achievement and to behave accordingly. Because of these difficulties, children with low effortful control will see their efforts to achieve autonomy and belongingness often failed. In turn, the repeated failure to satisfy these basic needs can increase the tendency to show unregulated behavior even further. Low levels of effortful control would then be especially related to externalizing problems, as is also established in previous research (Olson, Schilling, & Bates, 1999; Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2004; Ormel et al., 2005). Fearful children will also see their efforts to achieve their goals often failed because of their passive behavior. It may hinder them in approaching others, problem solving, and making their own decisions. This consequently leads to problems in satisfying the need for autonomy and belongingness. In turn, unsuccessful efforts to satisfy the basic needs will affect existing behavioral tendencies and thus lead to even more passive behavior in these children. Therefore, fearfulness can be expected to relate specifically to internalizing problems (Caspi et al., 1995; Oldehinkel et al., 2004; Ormel et al., 2005).

Based on the hypothesized effects described above, we reason that parental separation is especially harmful for children with a temperament characterized by low effortful control and high fearfulness, because they are already more likely to experience problems in goal realization. These temperamental difficulties in goal realization will be the most challenged when experiencing a stressor, in this case parental separation. Moreover, we reason that the nature of the temperament gives direction to the problems engendered when experiencing parental separation.

ration. Thus, in the presence of parental separation, which is shown to lead to overall problem behavior (see Lansford, 2009), children with low effortful control would be especially vulnerable to develop externalizing problems, whereas children with high fearfulness would be especially vulnerable to develop internalizing problems. Children with a temperament characterized by high effortful control or low fearfulness are assumed to be relatively resilient in the presence of a stressor such as parental separation.

Few studies have examined temperament traits as possible moderators of the mental health effects of parental separation (Hetherington, 1989; Kasen, Cohen, Brook, & Hartmark, 1996; Ruschena, Prior, Sanson, & Smart, 2005). Together, the few temperament studies suggest that a challenging temperament (although differentially operationalized) may have a main as well as a moderator effect. That is, a challenging temperament not only predicted more adjustment problems irrespective of parental separation (Ruschena et al., 2005), it also enhanced the negative effects of separation (Hetherington, 1989). Although these previous studies have provided important insights in the mental health effects of parental separation and temperament, they all had limitations in their study design and analytical methods, such as the post-separation measurement of temperament (Hetherington, 1989; Ruschena et al., 2005), operational confounding of temperament and mental health (Kasen et al., 1996), and lack of control for pre-separation adjustment (Hetherington, 1989). The present study attempts to overcome these shortcomings by including pre-separation measures of temperament, the use of multi-informant composite measures of adolescent externalizing and internalizing problems, and controlling for pre-separation mental health. In addition, because of our domain-specific hypotheses on the effects of parental separation in the combination with a specific temperament, we analyzed internalizing and externalizing problems separately while controlling for co-occurrence of problems (i.e., the overlap between externalizing and internalizing problems).

To sum up, the present study analyzed the effects of pre-adolescent temperament and parental separation during early adolescence on mental health problems in adolescence. Based on the literature reviewed above and our theoretical framework, we hypothesized that (1) overall (when ignoring possible interactions with child temperament), parental separation leads to an increase in mental health problems, particularly in externalizing problems. In addition, we postulated that the previously found effects of parental separation are small in magnitude (especially for internalizing problems) because, in most research, no distinction has been made between more and less vulnerable children. When such interactions between child characteristics and parental separation are taken into account, it can be hypothesized that (2) the effect of parental separation is moderated by child temperament, in such a way that (2a) parental separation in combination with low effortful control leads specifically to an increase in externalizing problems and (2b) parental separation in combination with high

fearfulness leads specifically to an increase in internalizing problems.

We controlled for gender and examined potential gender differences in the hypothesized relations. This was done on an explorative basis, because the literature has been inconsistent on potential differences between boys and girls with regard to the effects of parental separation. Some studies report that girls have more adjustment problems than boys following a parental separation, others report that boys have more adjustment problems than girls, and still others report no gender differences at all (Lansford, 2009).

Method

Sample

This study is part of the TRacking Adolescents' Individual Lives Survey (TRAILS), an ongoing prospective cohort study based on a sample representative of the Dutch population, investigating the development of mental health from preadolescence into adulthood. Participants come from five municipalities, including both urban and rural areas, in the North of the Netherlands. So far, three data collection waves have been completed: T1 (2001–2002), T2 (2003–2004), and T3 (2005–2007). A detailed description of the study design, sampling procedures, data collection, and measures of the TRAILS study can be found in De Winter et al. (2005) and Huisman et al. (2008).

Of all children approached for enrollment in the study, 76.0% participated, resulting in a sample size of 2230 (i.e., both the child and the parent actively agreed to participate). The mean age of the children at T1 was 11.09 years ($SD = 0.55$); 50.8% were girls; 10.3% had at least one parent born in a non-Western country. Of the original number of participants, 81.4% ($n = 1838$) participated in (at least one part of) the third wave of the study (T3). The mean age at T3 was 16.27 years ($SD = 0.73$) and 52.3% were girls. For the present analyses, we made use of the 1661 cases that filled out the questionnaires at T3. Of these 1661 cases, we excluded T3 participants of whom one or both of the biological parents had died ($n = 20$), who had always lived with a single parent ($n = 36$), lived with foster parents or other caregivers ($n = 9$), or experienced parental divorce or separation before T1 ($n = 328$). Hence, the current analyses and results refer to adolescents who had intact families at baseline ($n = 1274$).

Measures

Adolescent mental health. Internalizing and externalizing problem behaviors at T1 and T3 were assessed with the Child Behavior Checklist (CBCL), (Achenbach, 1991a), Youth Self-Report (YSR), (Achenbach, 1991b) and the Teacher Checklist of Psychopathology (TCP). The CBCL is one of the most commonly used questionnaires in current child and adolescent psychiatric research. It contains a list of 120 behavioral and emotional problems, which parents can rate as 0 = not true, 1 = somewhat or sometimes true, or 2 = very or often true in the past 6 months. The

internalizing domain encompasses three highly correlated syndrome scales: anxious/depressed, withdrawn/depressed, and somatic complaints. The externalizing domain consists of the highly correlated Aggressive behavior and Rule-breaking behavior syndrome scales. The YSR is the self-report version of the CBCL and yields the same syndrome and domain scales. The good reliability and validity of the CBCL and YSR were confirmed for the Dutch translation (Verhulst, van der Ende, & Koot, 1996; 1997). The teachers filled out the TCP which contains descriptions (vignettes) of problem behaviors corresponding to the syndrome scales of the CBCL and YSR (one vignette for each syndrome, with scores ranging from 0 to 4). The TCP vignettes correlated around 0.60 with the full Teacher's Report Form syndrome scales filled out by a small sample of teachers (internal report available upon request).

The agreement between parent-reported, adolescent-reported, and teacher-reported problems was, as expected, moderate (for internalizing problems at T1 range: .27–.31 and at T3 range: .34–.46; for externalizing problems at T1 range: .28–.32 and at T3 range: .25–.39). Each informant perceives different aspects of problem behavior in different contexts and differences between informants are meaningful (Kraemer et al., 2003; Noordhof, Oldehinkel, Verhulst, & Ormel, 2008). An advantage of using multiple informants is that it reduces the bias associated with mono-informant information (Angold & Costello, 1996; Sourander, Helstelä, & Helenius, 1999). Based on these considerations, we used the mean of the standardized parent, adolescent, and teacher scores (of which at least one had to be available) as a measure of internalizing and externalizing problems in the regression analyses.

Parental separation. Parental separation was assessed at T3 by an Event History Calendar (EHC), a data collection method for obtaining retrospective data about life events and activities. The calendar as developed by Caspi and colleagues (1996) was adapted into an interview covering several life domains and lasted about 45 minutes on average. Participants were asked about events that had occurred since the first assessment (age 11), including parental separation (legally or not). Adolescents whose parents had separated before T1 (assessed at T1) but legally divorced after T1 were not included for analysis in the present study. In total, 107 adolescents with intact families at baseline reported parental separation between T1 and T3.

Temperament. Temperament was assessed at T1 by the Dutch parent version of the short form of the Early Adolescent Temperament Questionnaire-Revised (EATQ-R) (Putnam, Ellis, & Rothbart, 2001). The EATQ is a questionnaire based on the temperament model developed by Rothbart, Ahadi, and Evans (2000). For the present study, we used the scale Effortful control (11 items, $\alpha = .86$), which refers to the capacity to voluntarily regulate behavior and attention, e.g., "Is usually able to stick with his/her plans and goals" and the scale Fearfulness (5 items, $\alpha = .63$), which denotes worrying and unpleasant affect related

to the anticipation of distress, e.g., "Worries about our family when s/he is not with us."

Analyses

First, we calculated the means of the variables used in the study for adolescents with and without a parental separation and tested differences by means of *t*-tests. In addition, Pearson and point-biserial correlations between the variables were calculated. Next, we assessed main and interaction effects of parental separation and temperament on each dependent variable (the T3 mean informant scores of internalizing or externalizing problems) in a two-step regression analysis. In the first step, we regressed the T3 outcome on the T1 problem score, gender, parental separation and the two temperament traits, and in the second step the interaction terms (temperament by separation) were included. The T1 problem score was included as a covariate to adjust for the amount of problems at T1, prior to parental separation. Because of this adjustment the effects of parental separation and temperament regard the development of (or change in) problems between T1-T3. As we had domain-specific hypotheses we also controlled for co-occurrence of problems (i.e., the overlap between the domains of internalizing and externalizing problems) by adding the T3 scores of the non-outcome domain as predictor (covariate) in the model. Thus, the model with T3 internalizing problems as the dependent variable included T3 externalizing problems as predictor, and the other way around. A similar approach was used in other studies, which showed that this strategy is helpful in testing theory-based domain-specific effects (see Ormel et al., 2005; Sentse et al., 2009).

To minimize problems of multicollinearity and ease interpretation of the regression coefficients, all continuous variables were standardized to mean 0 and standard deviation 1 (Aiken & West, 1991). Interaction terms were created by multiplying the standardized scores.

Results

Descriptive Statistics and Bivariate Associations

Table 1 presents mean problem scores at T1 and T3 for adolescents with and without parental separation, for each informant separately. According to all informants, externalizing problems at T3 were higher in those who had experienced parental separation (although not significantly for teacher reports). For internalizing problems only the parent-reported problems at T3 were higher. In addition, T1 effortful control was lower in children who experienced parental separation between T1 and T3, whereas their T1 externalizing behavior was higher according to teachers.

Table 2 presents correlations between the variables that were used in the regression analyses. As indicated by the T1-T3 correlations, there is substantial continuity in problem behaviors from preadolescence into adolescence. Preadolescent fearfulness was not associated with parental separation during the transition into adolescence, but effortful control was negatively correlated.

Table 1
Means and Standard Deviations of the Variables Under Study, by Parental Separation

Variables	No parental separation		Parental separation		Differences <i>t</i> (<i>df</i>)
	<i>M</i> (<i>SD</i>)	<i>n</i>	<i>M</i> (<i>SD</i>)	<i>n</i>	
Self-reported mental health					
T1 Externalizing problems	0.26 (0.19)	1175	0.28 (0.18)	105	-1.05 (1278)
T3 Externalizing problems	0.29 (0.21)	1185	0.37 (0.20)	107	-3.49 (1290)***
T1 Internalizing problems	0.36 (0.23)	1174	0.37 (0.26)	106	-0.34 (1278)
T3 Internalizing problems	0.30 (0.24)	1180	0.31 (0.22)	106	-0.32 (1284)
Parent-reported mental health					
T1 Externalizing problems	0.22 (0.18)	1124	0.25 (0.18)	105	-1.78 (1227)
T3 Externalizing problems	0.15 (0.17)	1054	0.23 (0.22)	84	-4.19 (1136)***
T1 Internalizing problems	0.24 (0.19)	1124	0.21 (0.14)	105	1.33 (1227)
T3 Internalizing problems	0.17 (0.18)	1053	0.22 (0.20)	83	-2.29 (1134)*
Teacher-reported mental health					
T1 Externalizing problems	0.30 (0.59)	1027	0.55 (0.83)	96	-3.83 (1121)***
T3 Externalizing problems	0.36 (0.68)	668	0.53 (0.99)	58	-1.77 (724)
T1 Internalizing problems	0.60 (0.73)	1025	0.53 (0.61)	96	0.85 (1119)
T3 Internalizing problems	0.79 (0.82)	658	0.80 (0.80)	57	-0.09 (713)
Child temperament					
T1 Effortful control	3.31 (0.68)	1085	3.03 (0.65)	100	3.98 (1183)***
T1 Fearfulness	2.40 (0.72)	1084	2.38 (0.67)	99	0.37 (1181)

Note. Teacher-reported problems have a different scale (0–4) than self- and parent-reported problems (0–2).

* $p < .05$. ** $p < .01$. *** $p < .001$.

Fearfulness and low effortful control were negatively correlated, and both temperamental aspects correlated with higher levels of problems at T1, and, to a slightly lower extent, with problems at T3. The correlations between internalizing and externalizing problems indicate both moderate co-occurrence of these problems and substantial unique, nonshared variance. Externalizing but not internalizing problems (at both T1 and T3) were positively correlated with parental separation.

Regression Analyses

Although our goal was to examine the longitudinal influence of parental separation during adolescence (in interaction with child temperament) on adolescent mental health problems, we firstly checked whether the timing of the separation was of importance for its effect. Mental health problems in adolescence did not differ between children that experienced parental separation between T1 and T2 and those experiencing separation between T2 and T3 ($p > .05$).

Gender differences. There was no effect of gender on the change in externalizing problems from T1 to T3. In contrast, internalizing problems increased more in girls relative to boys during the T1-T3 interval. Two- and three-way interactions with gender were tested but not significant and therefore not reported in the tables.

Externalizing problems (Table 3). As hypothesized, parental separation and low effortful control, not fearfulness, were associated with an increase in externalizing problems. The interactions between parental separation and temperament showed that the impact of parental separation was moderated by the level of effortful control. The interaction between parental separation and effortful control is presented in Figure 1. The simple slope (cf. Aiken & West, 1991) for adolescents 1 *SD* below the mean of effortful control was 0.42, $t = 4.67$, $p < .01$, whereas it was 0.09, $t = 0.78$, $p = .44$ for adolescents 1 *SD* above the mean of effortful control. In other words, when exposed to parental separation, externalizing problems increased only for adolescents with poor effortful control.

Table 2
Correlations Between the Variables Under Study

Variables	1	2	3	4	5	6	7	8
1. Separation*	—							
2. Gender (boys = 1)*	-.01	—						
3. T1 Externalizing problems	.06	.26	—					
4. T3 Externalizing problems	.16	.07	.47	—				
5. T1 Internalizing problems	-.03	-.05	.37	.17	—			
6. T3 Internalizing problems	.05	-.24	.14	.37	.48	—		
7. Effortful control	-.08	-.18	-.35	-.27	-.24	-.16	—	
8. Fearfulness	-.02	-.12	.12	.09	.34	.20	-.23	—

Note. Correlations $> |.05|$: $p < .05$.

* Point-biserial correlations.

Table 3

Adolescent Externalizing Problems (T3) Regressed on Preadolescent Externalizing Problems (T1), Gender, Parental Separation Between T1-T3, Preadolescent Temperament, and Their Interactions (N = 1172)

Variables	T3 Externalizing problems ($R^2 = .33$)				
	Main effects model		Interactions effects model		
	<i>b</i> (SE)	<i>p</i>	<i>b</i> (SE)	<i>p</i>	
T1 Externalizing problems	.45 (.03)	.00	.44 (.03)	.00	
Gender (boys = 1)	.07 (.04)	.12	.07 (.04)	.11	
Separation T1-T3	.31 (.07)	.00	.26 (.07)	.00	
Effortful Control	-.06 (.02)	.01	-.05 (.02)	.03	
Fearfulness	-.03 (.02)	.18	-.03 (.02)	.23	
Separation * effortful control			-.16 (.08)	.03	
Separation * fearfulness			-.05 (.08)	.51	

Note. Regression models adjusted for concurrent T3 internalizing problems.

Internalizing problems (Table 4). There was no main effect for parental separation or pre-adolescent temperament, but interactions showed that the effect of parental separation on internalizing problems depended on child temperament (see Figure 2). As expected, simple slopes (cf. Aiken & West, 1991) showed that parental separation only led to an increase in internalizing problems for adolescents high on fearfulness ($b = 0.24$, $t = 2.01$, $p < .05$) but not for those low on fearfulness ($b = -0.10$, $t = -0.99$, $p = .32$).

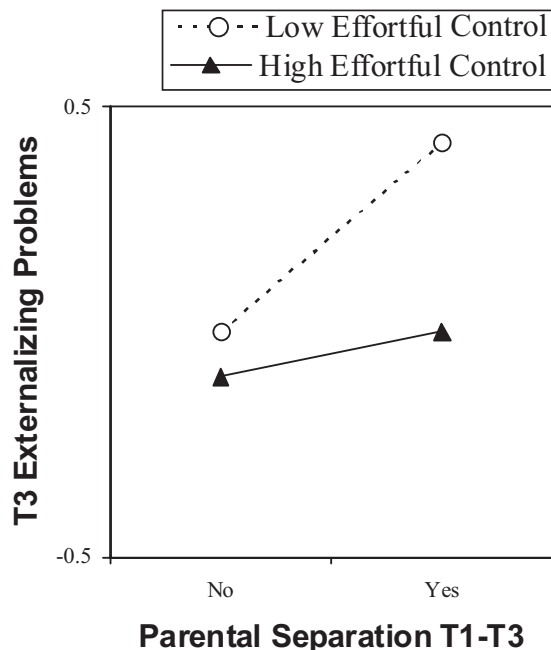


Figure 1. Interaction between effortful control and parental separation in the prediction of adolescent externalizing problems at T3, while controlling for externalizing problems at T1, co-occurrence of problems, and gender.

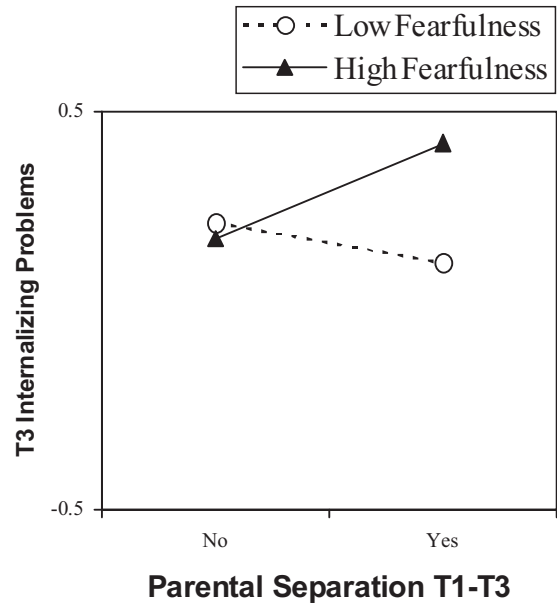


Figure 2. Interaction between fearfulness and parental separation in the prediction of adolescent internalizing problems at T3, while controlling for internalizing problems at T1, co-occurrence of problems, and gender.

Co-occurrence of problems. Rerunning the analyses without controlling for the overlap between externalizing and internalizing problems led to the same main effects for externalizing problems as reported in Table 3. The interaction between parental separation and effortful control, however, was not significant anymore ($p = .14$). In addition, without controlling for co-occurrence of externalizing problems the main effect of effortful control on internalizing problems became statistically significant, whereas the interaction between separation and fearfulness was only marginally significant ($p = .08$). Thus, the reported effects of parental separation, temperament, and their interactions pertain mainly to the “pure” measures of externalizing and internalizing problems in which their co-occurrence is accounted for.

Discussion

The aim of this study was to examine the moderating role of child temperament in the relation between parental separation during early adolescence and the development of mental health problems in adolescence. In accordance with previous reviews (Amato, 2001; Lansford, 2009), we argued that parental separation by itself would not have a substantial effect on adolescent adjustment; instead, it might especially or only affect the children that are already vulnerable for developing mental health problems. Hereby we concentrated on two temperament aspects that may moderate and give direction to the impact of parental separation, namely low effortful control and fearfulness. We hypothesized that parental separation in combination with low effortful control would lead to an increase in specifically

Table 4
Adolescent Internalizing Problems (T3) Regressed on Preadolescent Internalizing Problems (T1), Gender, Parental Separation Between T1-T3, Preadolescent Temperament, and Their Interactions (N = 1172)

Variables	T3 Internalizing problems ($R^2 = .37$)				
	Main effects model		Interactions effects model		
	<i>b</i> (SE)	<i>p</i>	<i>b</i> (SE)	<i>p</i>	
T1 Internalizing problems	.47 (.03)	.00	.47 (.03)	.00	
Gender (boys = 1)	-.40 (.04)	.00	-.40 (.04)	.00	
Separation T1-T3	.02 (.07)	.76	.07 (.07)	.38	
Effortful control	-.02 (.02)	.35	-.03 (.02)	.20	
Fearfulness	.00 (.02)	.66	-.01 (.02)	.37	
Separation * effortful control			.14 (.08)	.08	
Separation * fearfulness			.17 (.08)	.03	

Note. Regression models adjusted for concurrent T3 externalizing problems.

externalizing problems, whereas the combination with fearfulness would lead to an increase in specifically internalizing problems. Controlling for co-occurrence of the problem domains, the findings were in line with our hypotheses. Gender did not seem to impact these relations.

We found a main effect of parental separation on the development of externalizing problems only. This is in line with meta-analyses that also revealed that, on average, the effect of parental divorce is greater for externalizing problems than for internalizing problems (Lansford, 2009). This might be the case because parents who are being caught up in (the consequences of) a divorce have less opportunities to supervise and monitor their children (Cherlin, Chase-Lansdale, & McRae, 1991). This creates opportunities for their children to misbehave, such as hanging out with delinquent friends and acting antisocially. However, our results do not rule out (stronger) effects on internalizing problems later in life. In fact, Cherlin and colleagues (1998) studied the longitudinal effects of divorce from childhood to the age of 33 and concluded that effects of separation on emotional problems increase with age and may therefore not become salient until in late adolescence or adulthood.

The reason for the overall small main effects of parental separation, both in our study and other studies (see Lansford, 2009), may be found in the degree of the associated difficulties and stress that accompanies a parental separation. It usually follows after a period of marital conflict, meaning that the stress of marital disruption begins long before the separation (Smith & Jenkins, 1991). By using a baseline measure of mental health problems we controlled for pre-existing difficulties the child might be experiencing. But for at least some of the children, marital separation might be a relief from the stress of their parents' marital conflict (Booth & Amato, 2001). Thus, the finding of generally small main effects of separation could be the result of some children showing negative reactions and others showing more positive functioning.

The focus of the current study was, however, not on the main effects of parental separation but on its interplay with

child temperament. Child temperament was selected as a marker for vulnerability to mental health problems and the temperamental difficulties are expected to be especially challenged when experiencing stressors such as parental separation. We therefore argued that parental separation would have an effect only or especially on adolescents who already had an increased vulnerability to develop mental health problems. It is well established that children with a challenging temperament are more likely to develop emotional and behavioral problems than children without such a temperament (e.g., Caspi et al., 1995; Frick & Morris, 2004). Reasons for this association may be found in, for example, the inability to regulate or control behavior and thus a lower capacity to conform to behavioral norms in interacting with others (low effortful control) and the inability to approach other people and social situations (high fearfulness). This in turn may hinder adolescents to satisfy the need to belong and the need for autonomy, which can be seen as a chronically focal goal in adolescence. Problems in the realization of these two goals are thus prime suspects for the development of pathology. A child's vulnerability for mental health problems as defined by temperamental characteristics may therefore moderate the effect of parental separation both in strength and direction.

The first hypothesized interaction involved low effortful control. In accordance with previous studies that marked low effortful control as a risk factor for especially externalizing problems (e.g., Caspi et al., 1995; Oldehinkel et al., 2004; Ormel et al., 2005), we expected that children who experienced parental separation during early adolescence and who are low on effortful control would have increased externalizing problems in adolescence. Controlling for pre-separation problem behavior as well as co-occurrence of internalizing and externalizing problems, we found that children low on effortful control developed more externalizing problems in adolescence than children high on effortful control. In addition, parental separation had a larger effect on the development of externalizing problems in children low on effortful control. In other words, children with high effortful control seem to have more adaptive capacities to deal with the consequences and associated stress of a parental separation, which are explained above. These children may be better able to channel their feelings through adaptive behavior and to gain social acceptance and support from friends, for example, that helps them to achieve their goals and maintain healthy functioning.

The second hypothesized interaction involved fearfulness. This temperamental characteristic has previously been found to be a risk factor for specifically internalizing problems (Caspi et al., 1995; Oldehinkel et al., 2004; Ormel et al., 2005). We hypothesized that fearful children who experienced parental separation during early adolescence would develop internalizing problems in adolescence. In line with this, we found that parental separation only led to an increased level of internalizing problems in adolescence for children who are high on fearfulness and not for those low on fearfulness. Highly fearful children may be less able than low fearful children to compensate for the consequences of parental separation and the accompanying dis-

tress. A vicious cycle of withdrawal, being ignored by peers, and anxious or depressive feelings may appear. This likely hinders these children to fulfill the need to belong and the need for autonomy, resulting in mental health problems. Although girls were more likely than boys to have internalizing problems in adolescence, and fearfulness increased the effect of parental rejection for girls only (Oldehinkel, Veenstra, Ormel, De Winter, & Verhulst, 2006), we found no gender difference in the combined effect of fearfulness and parental separation. Thus, girls are higher on internalizing problems than boys but this difference is not a result from a differential effect of parental separation and fearfulness.

Because we had formulated hypotheses that were specific for either externalizing or internalizing problems, we controlled for the overlap between the two problem domains in the analyses (cf. Ormel et al., 2005; Sentse et al., 2009). When we did not take this overlap into account, the effects were in the same direction but their strength weakened. Especially the interactions dropped in significance. In addition, effortful control became related to internalizing problems. These results strengthen our assumptions about the specificity of the predictors, with effortful control primarily linked to externalizing problems and fearfulness primarily linked to internalizing problems. Thus, although parental separation may have an effect on both problem behaviors, the present study showed that the specificity of its effect depends on child temperament and that effects of parental separation may thus differ per child. In addition to child temperament, future studies may look into more generic vulnerabilities for mental health problems that potentially moderate the effects of parental separation.

The interactions between child temperament and parental separation that were found in the current study can help to explain the diversity in effects of parental separation found in other studies. That is, children react differently to the same family factors, dependent on their temperament (see also Sentse et al., 2009). These person-environment interactions should be taken into account both in research and in clinical practice.

Strengths and Limitations

The current study has some major assets as compared to previous studies. Firstly, in examining the influence of parental separation during early adolescence, we used a longitudinal design by looking at mental health problems in adolescence while controlling for pre-separation mental health. In addition, we took into account vulnerability for mental health problems that may shape the strength and direction of the effect of parental separation, namely child temperament measured before the separation. Thirdly, we made use of three different informants for the composition of our measures, which adds to the validity of the measures and lowers the chance of shared method variance that may lead to inflated associations. Lastly, we were able to examine two broad domains of mental health problems, which allowed us to adjust for the overlap between the two and thus examine the specificity of the predictors. Our method

implies that we did not specifically look at the shared variance of externalizing and internalizing problems, i.e., the parts within the two types of problem behavior problem that overlap.

Next to these strengths, some limitations should be mentioned. First, there might be operational confounding between the psychopathology and temperament measures, although the informant and time frame of the items differ considerably. Even if some operational confounding has occurred, we believe that it has not biased the results. Operational confounding would be expected to have affected the association between preadolescent temperament and T1 psychopathology more than the association with T3 psychopathology as T1 and T3 were about four years apart. We adjusted for T1 psychopathology, and therefore adjusted for the variance in temperament shared with T1 psychopathology (due to causal effects and operational confounding). If anything, operational confounding led to an underestimation of the influence of temperament (which might explain the small main effects of temperament). Furthermore, it is unlikely that operational confounding could have biased moderator effects of temperament.

Second, at T3 there were quite some missing values for the teacher reports, meaning that for a substantial part of the sample the outcome measures only consisted of parent and child reports. We chose to use a composite measure for our outcome variables based on parent, child and teacher ratings because using multiple informants reduces the bias associated with mono-informant information (Angold & Costello, 1996; Sourander et al., 1999). To be sure that these missing values did not influence the results of the current study we also performed the analyses with outcome measures based on parent and child reported scores only. These results did not differ from the results reported in this study.

Lastly, we used a goal-framing approach to generate testable hypotheses and to explain our results, but did not measure the underlying factors concerning goal pursuit directly. Other studies, however, have provided clear evidence for the link between (thwarted) goal pursuit regarding fundamental needs (for autonomy and belongingness) and the development of psychopathology (e.g., Assor, Roth, & Deci, 2004; Baumeister, DeWall, Ciarocco, & Twenge, 2005; Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007).

To conclude, the current study showed that parental separation overall has a mild impact on adolescent mental health, mainly on the development of externalizing problems. This impact is, however, moderated by child temperament, which was considered to reflect vulnerability to mental health problems. It was shown that the challenging temperament children are the most affected by parental separation. The results were domain-specific: parental separation led to adolescent externalizing problems only for children low on effortful control, whereas it led to adolescent internalizing problems only for children high on fearfulness. Future research should explicitly acknowledge person-environment interactions in examining the development of mental health problems.

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